



# **HALA! SESAR Research Network**

**Towards Higher Levels of Automation in ATM**

**A wide range for research.**

## **HALA! RESEARCH NETWORK WHITE PAPER**



ATACCS'2011  
27/5/2011



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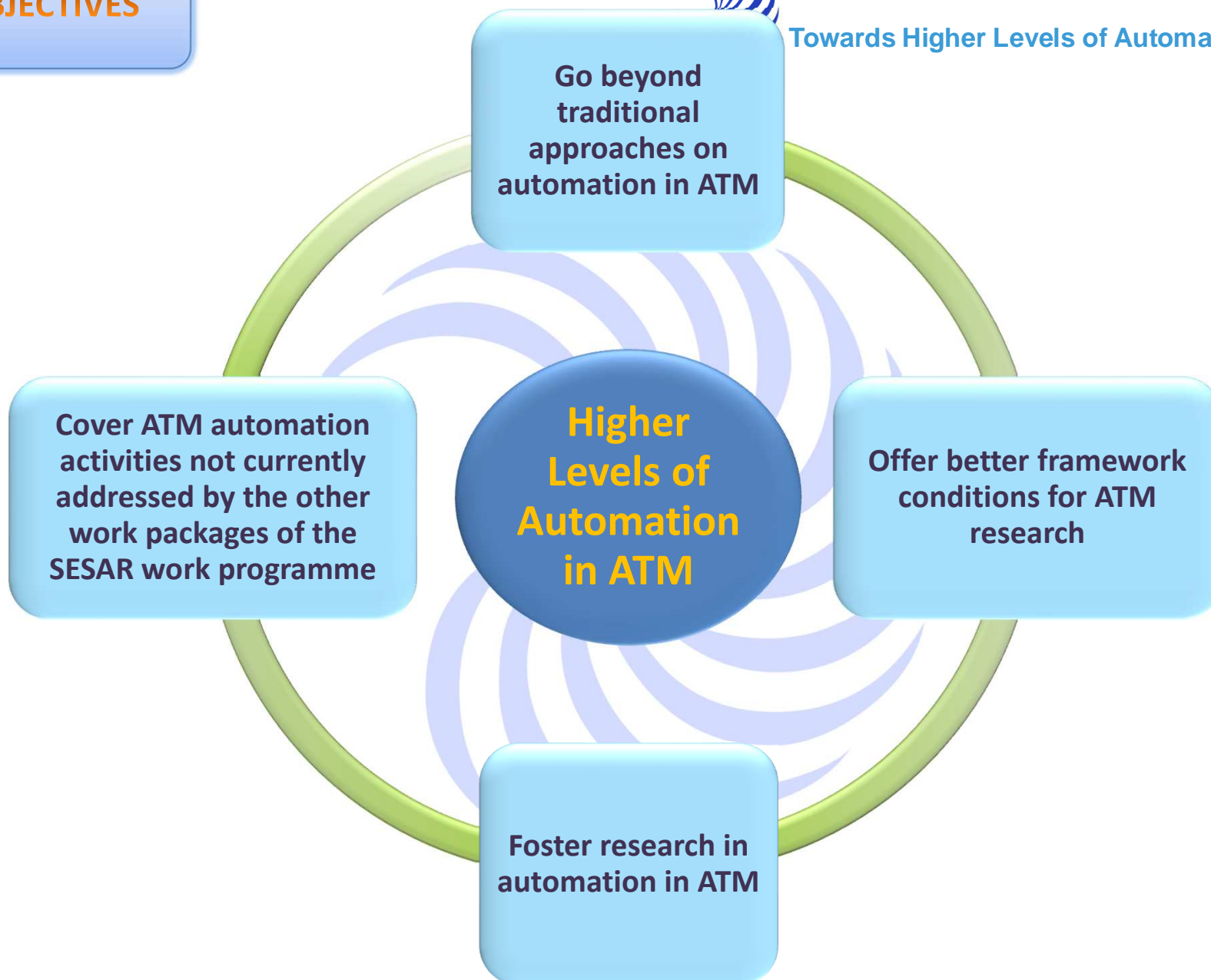
- **Objectives of HALA!**
- **Main Activities**
- **HALA! Magement Team**
- **Participants**
- **Intended Audience**
- **Heritage in ATM and Automation**
- **The new paradigm shift in Automation in ATM**
  - Overall system performance as main driver for ATM Automation
  - The three interdependent dimensions for the paradigm change.
  - New roles assignment based on :
    - “best time”
    - “decision place”
    - “best player”
- **HALA! main research areas**

## OBJECTIVES



**HALA! SESAR Research Network**

Towards Higher Levels of Automation in ATM



## MAIN ACTIVITIES



HALA! SESAR Research Network

Towards Higher Levels of Automation in ATM

### PhDs

- 2 Call for PhDs
- First call has already taken place
- Second Call for PhDs->June 2011

### Conferences

- HALA! Annual conference (**ATACCS**)
- Summer School
- Joint Conference

Promote the Best  
Research in  
Automation in  
ATM

### Progress on Automation

- **White paper**



Scientific collaborative platform  
**Pollinizer** (facilitator) [www.hala-sesar.net](http://www.hala-sesar.net)

**HALA!  
MANAGEMENT  
TEAM**



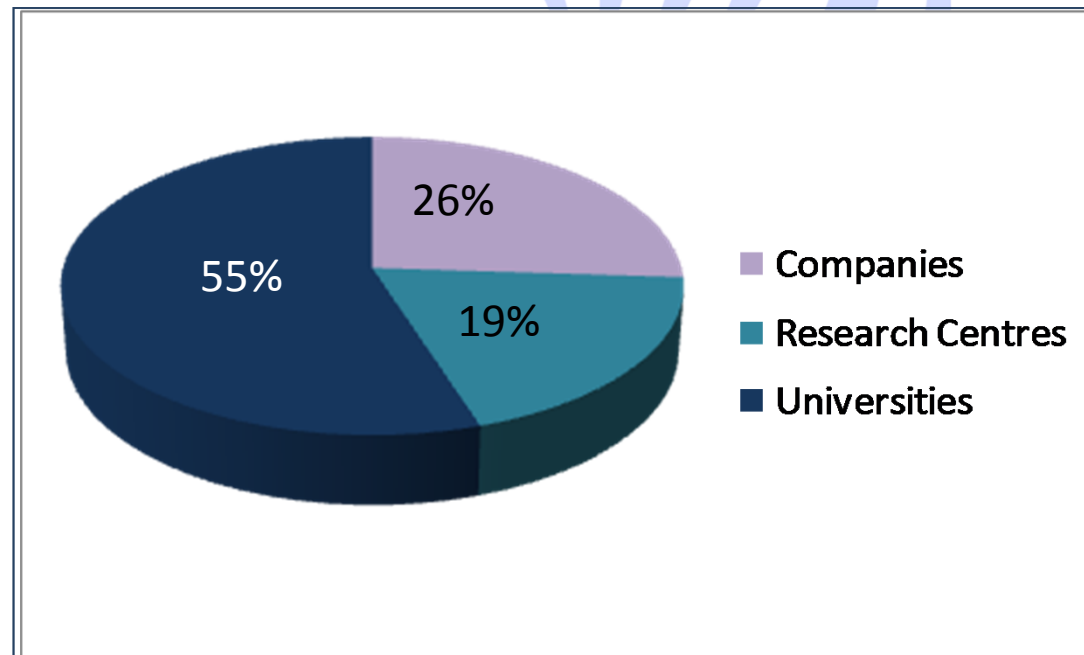
## PARTICIPANTS



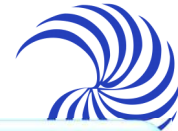
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Currently there are over **80 Organizations** in the Network!

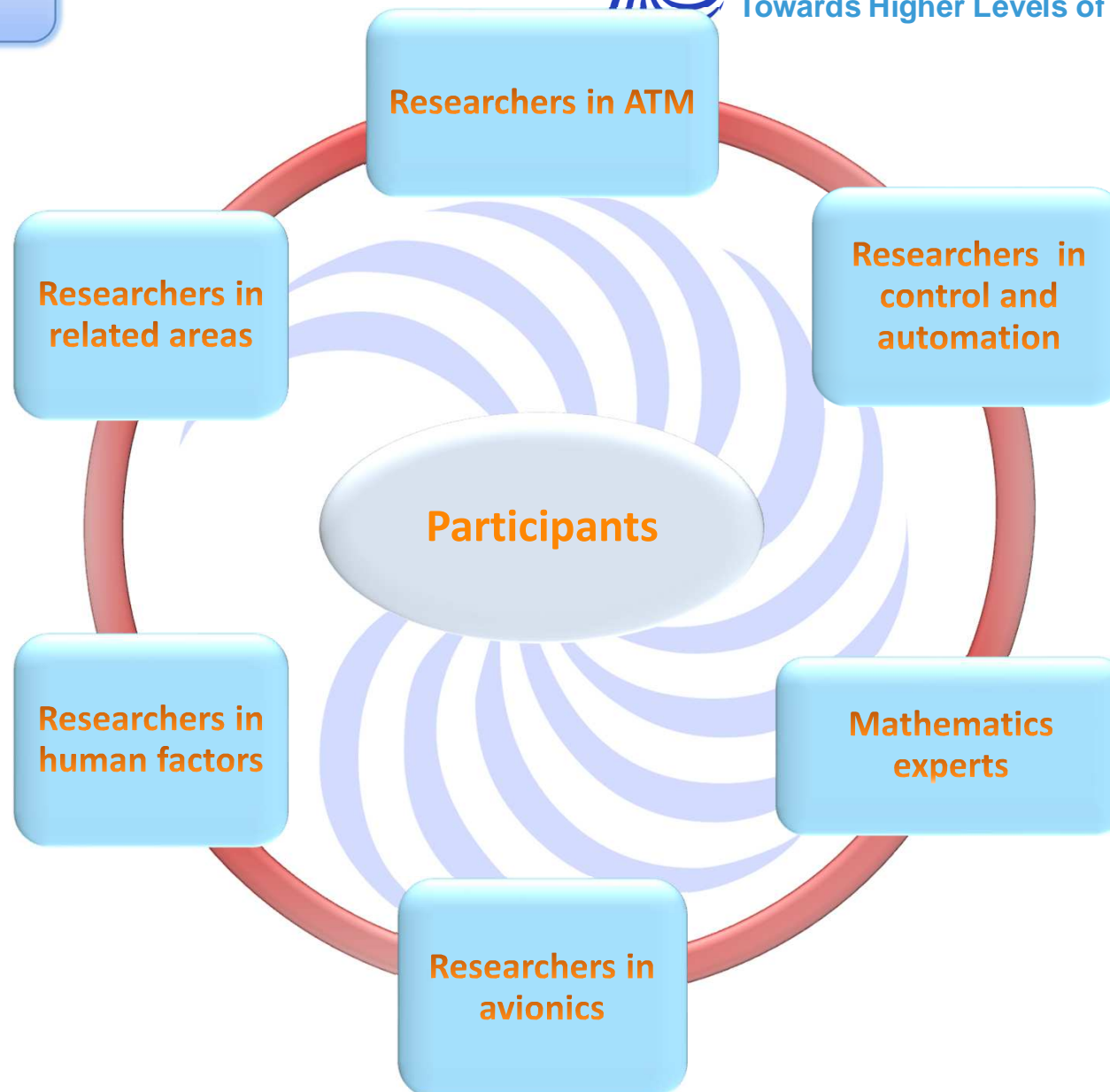
**300+** researchers registered in the HALA! Network



**AUDIENCE**



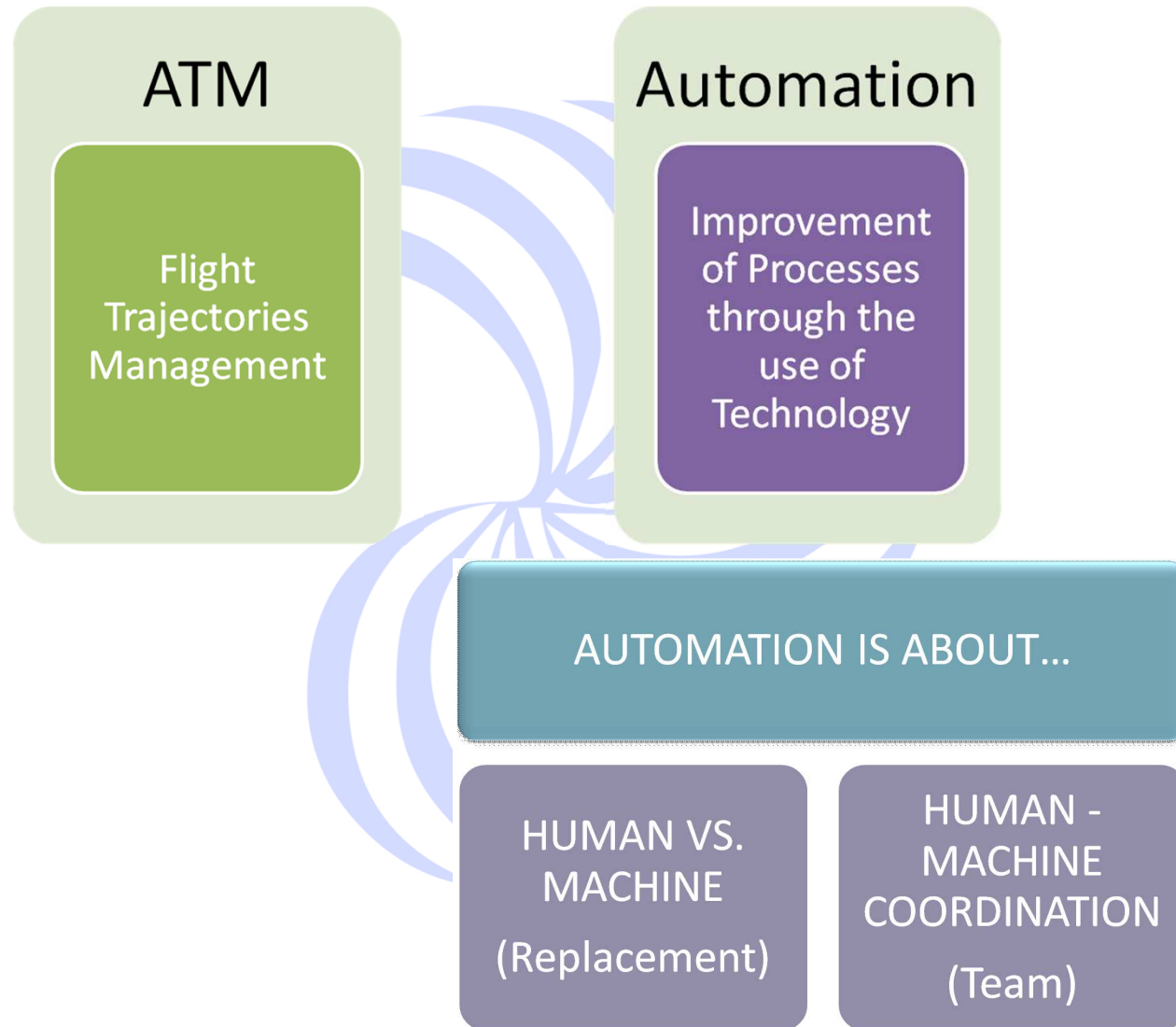
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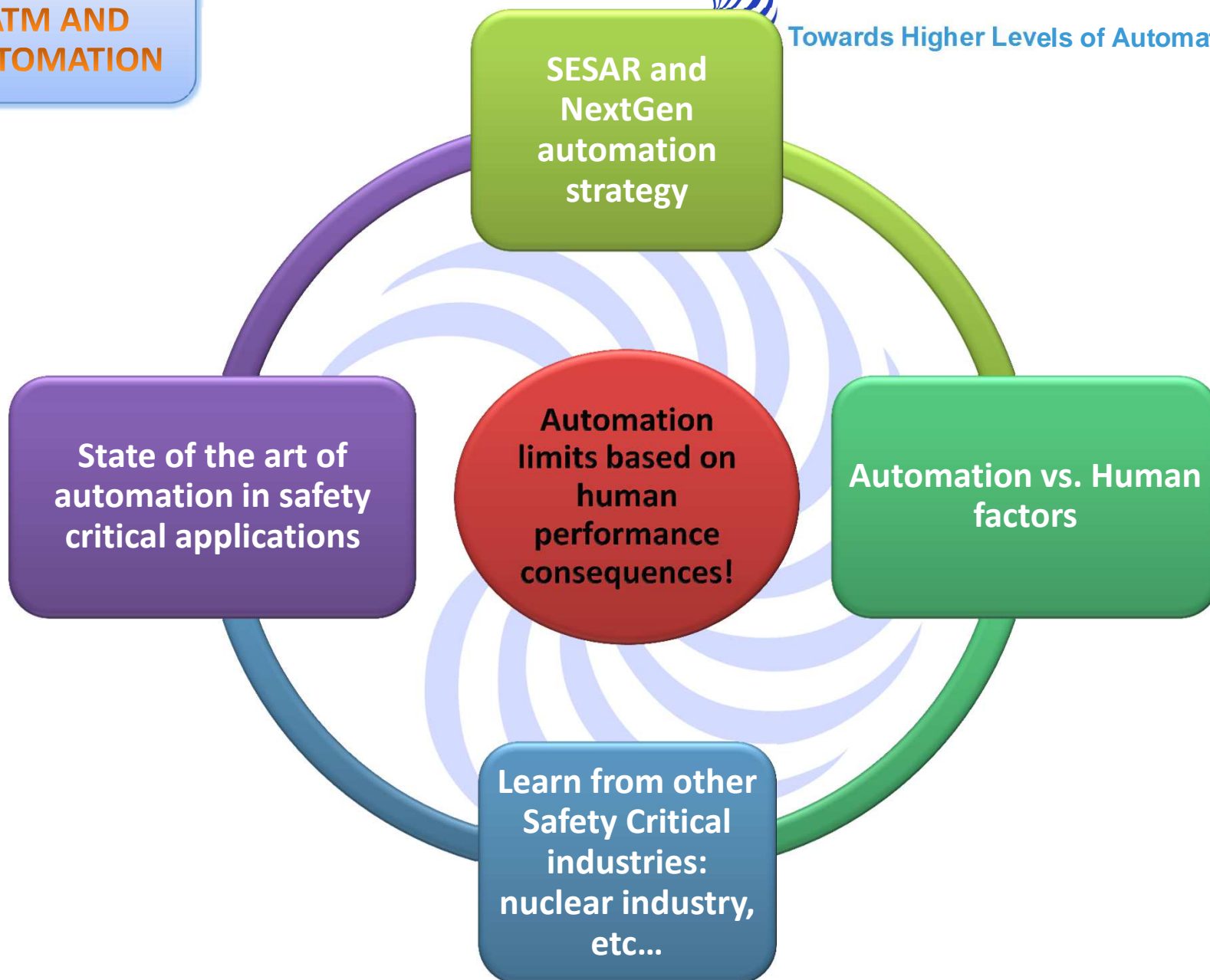
**STARTING LINE**



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1

Shift from Airspace – Based operation towards a Trajectory – Based operation concept.

2

Sh

“In the ATM Target Concept it is recognised that humans will constitute the core of the future European ATM Systems operations..”  
D3. – ATM Target Concept. SESAR.

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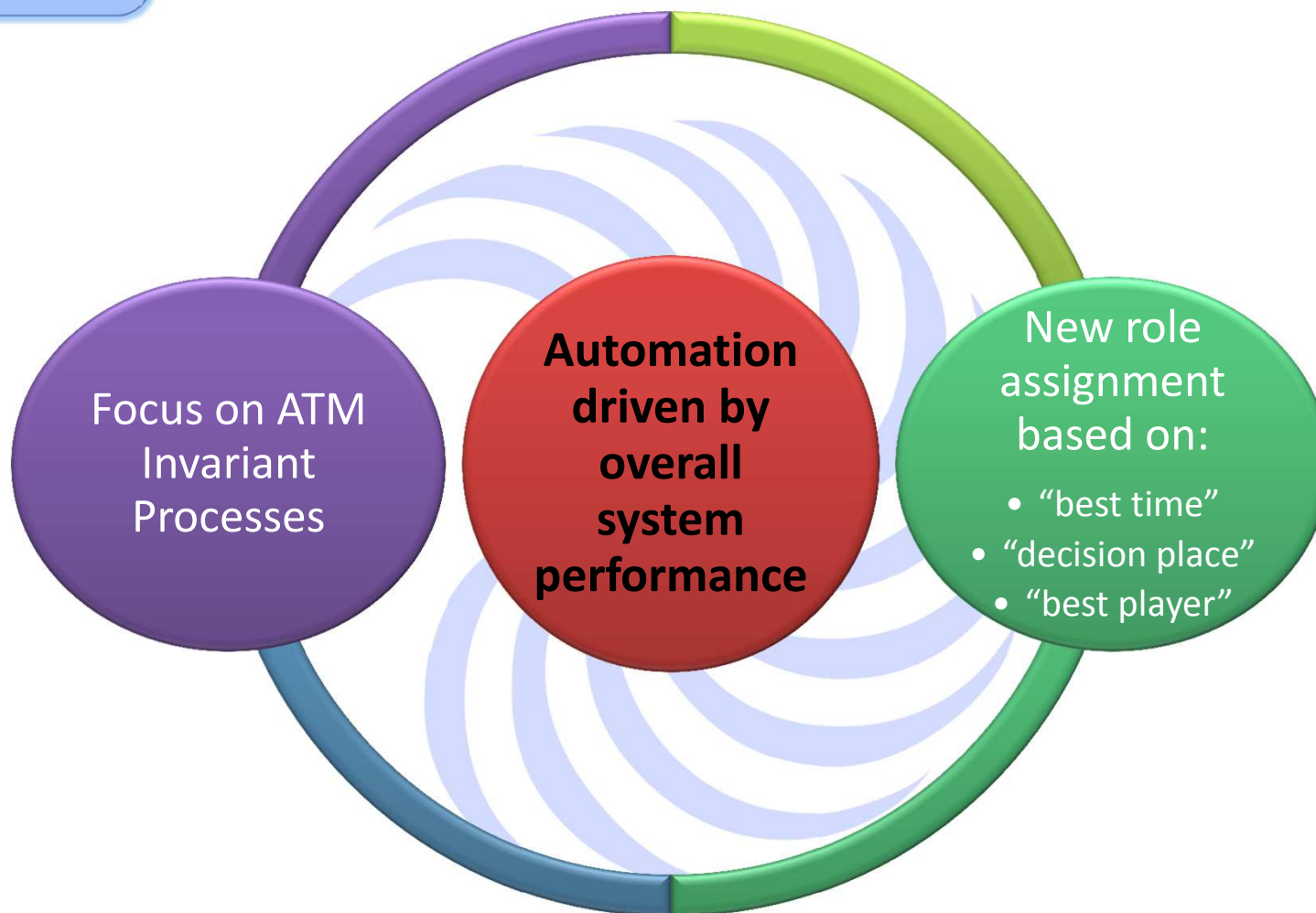
3

Shift from a controller-based system towards a more distributed system

**NEW PARADIGM  
SHIFT IN ATM  
AUTOMATION**



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# ATM Invariants

## Goals

## Limitations

Safety  
(Separation  
Assurance)

Efficiency  
(broad sense:  
user, provider  
& society )

Airport  
Capacity

Atmospheric  
Behaviour



## The three interdependent dimensions for the paradigm change

**New role assignment based on :**

First dimension  
“BEST TIME” for  
decision making:  
Strategic vs. tactical  
planning layer

Second dimension  
“DECISION PLACE”:  
Controlled vs.  
autonomy.

Third dimension  
“BEST PLAYER”:  
Human vs.  
automated player.

First dimension “BEST TIME” for decision making:  
Strategic vs. Tactical layer questions to be answered

STRATEGIC VS. TACTICAL

- What is the impact of **uncertainties** in a system when most decisions are a **taken long time** in advance?
- As ATM processes, at different planning layers, will have feedback to absorb unexpected changes: will the overall system (composed by different nested loops) maintain the required **stability**?
- Do **strategic functions** imply more complex and **rigid operational scenarios**?
- Can **tactical** decisions alone **manage ATM** goals and limitations?
- Other?

## Second dimension “DECISION PLACE”: Controlled vs. Autonomy questions to be answered

### CONTROLLED VS. AUTONOMY

- What is the level of **correlation** between **complexity** and **centric** controlled systems?
- **Autonomy: where?, When?** Are segregated airspace structures (UMAS/MAS) a solution?
- In which scenario (controlled or autonomous) will automation provide higher overall system performance?
- Is high **traffic density/complexity** a key factor **limiting autonomy**?
- Do **tactical decisions imply** autonomous and **fully automated** processes?
- Does **strategic decision making imply centric controlled** scenarios?
- Others?

## Third dimension “BEST PLAYER”: Human vs. Automated player questions to be answered

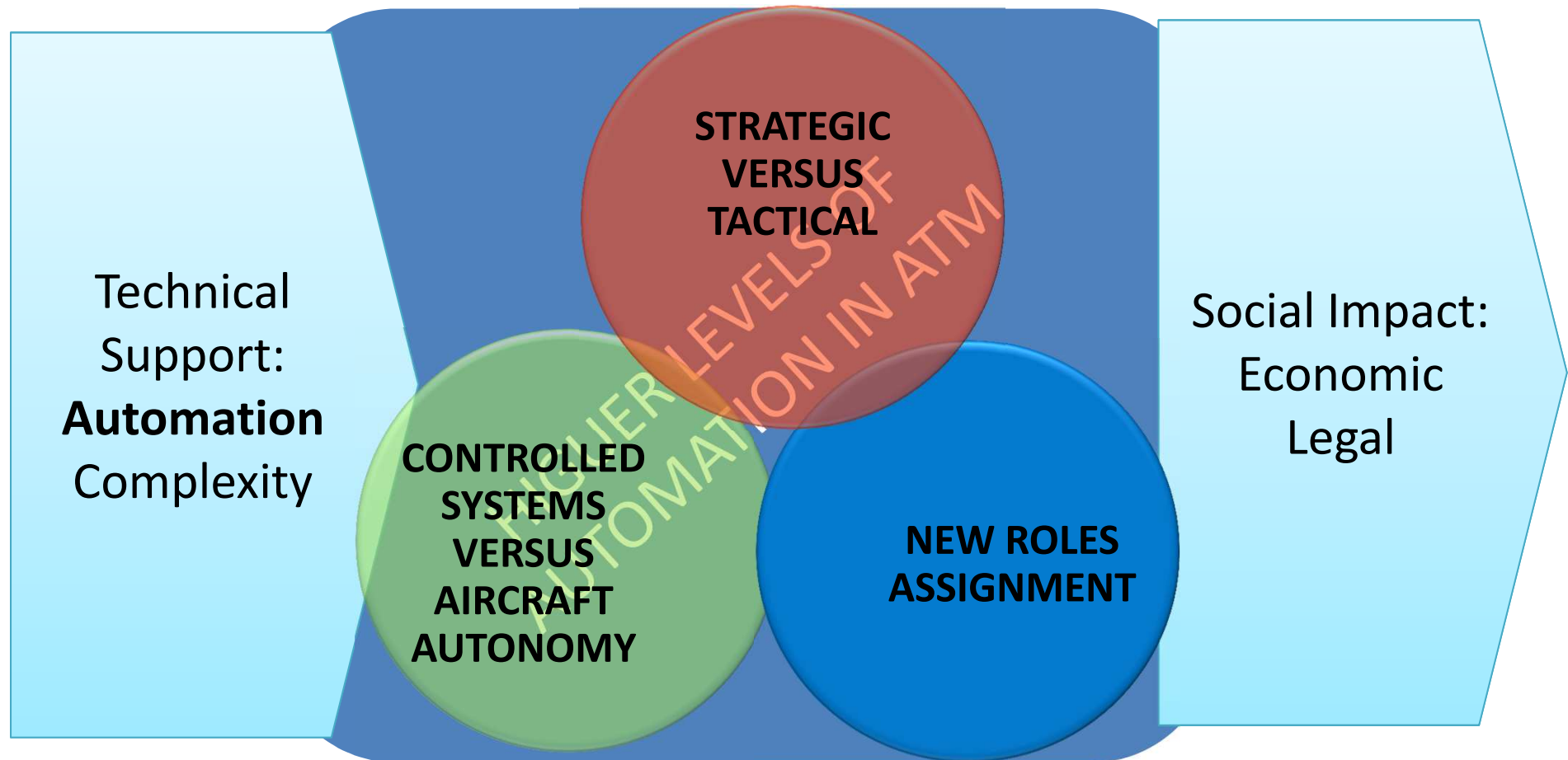
### HUMAN VS. MACHINE

- Should trajectory management (e.g.. Trajectory deconfliction, even tactical decisions) be fully automated?
- To what extent **do strategic decisions require human intervention?**
- **How can uncertainty be managed** in automated systems?
- Are the current frameworks for automation, cognition and human factors enough to **capture ATM singularities?**
- Is a fully automated air transport system **socially/psychologically acceptable?**
- Can the ATM system be decomplexified through automation?
- How to deal with **transition issues** when implementing higher levels of automation?
- How can **resilience** be taken into account in automated systems design?
- Does **uncertainty require human centred** decision-making?

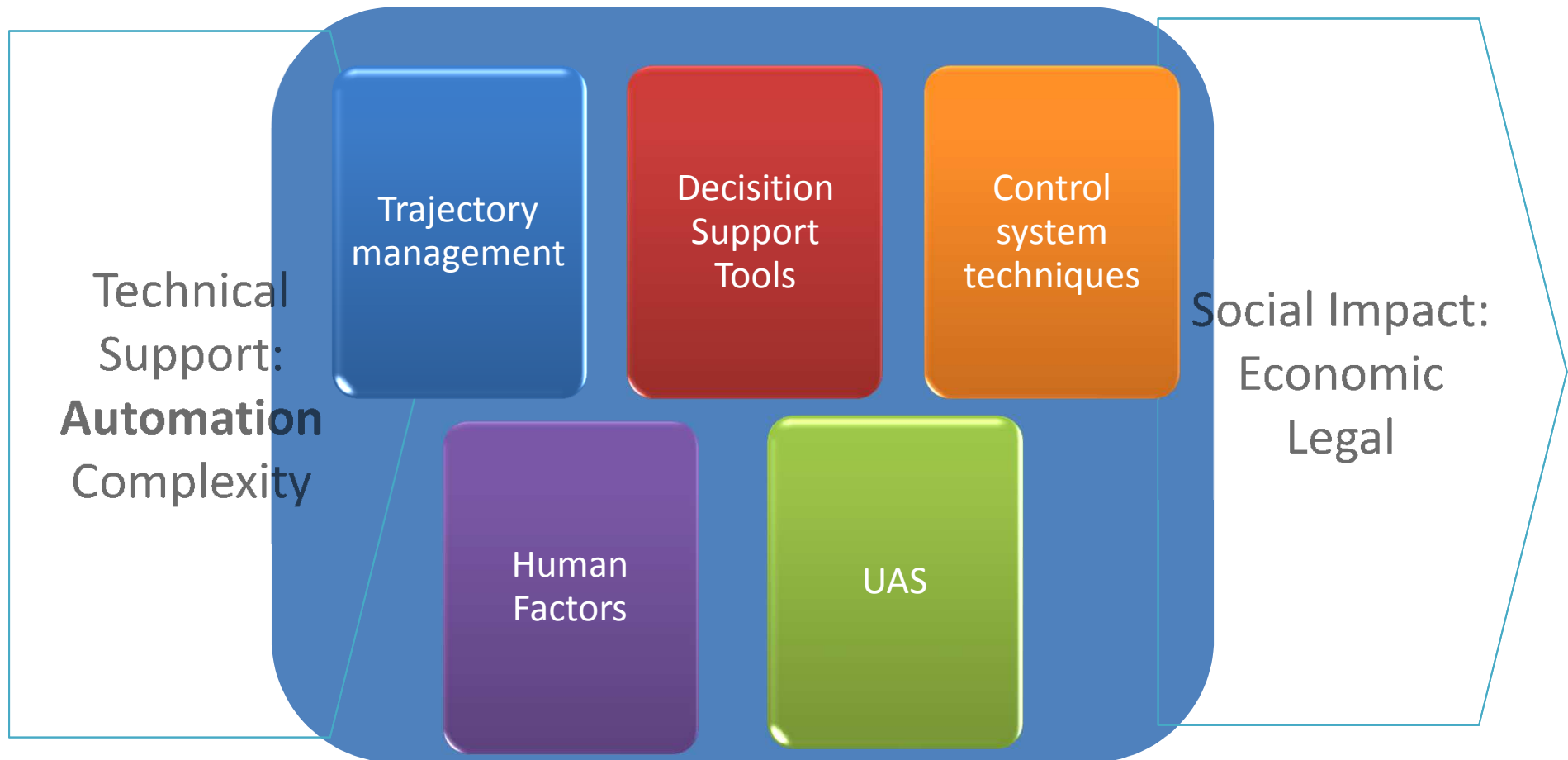




## HALA! main research areas



## HALA! main research areas





We need your expertise to improve  
the White Paper!

Please send your ideas to [hala@hala-sesar.net](mailto:hala@hala-sesar.net) or USE THE FORUMS INSIDE  
the HALA! Website!

Topic	Replies	Created	Last reply▼
✉ PhD Hall	0	2 weeks 4 hours ago by publisher	n/a
✉ Control System Techniques	0	10 weeks 6 days ago by publisher	n/a
✉ Seamless UAS Test Bed for Innovation	0	10 weeks 6 days ago by publisher	n/a
✉ Decision Support System	0	10 weeks 6 days ago by publisher	n/a
✉ Human Factors	0	10 weeks 6 days ago by publisher	n/a
✉ Trajectory Management	0	10 weeks 6 days ago by publisher	n/a
✉ Best Decision Player	0	10 weeks 6 days ago by publisher	n/a
✉ Best Decision Place	0	10 weeks 6 days ago by publisher	n/a
✉ Best Decision Time	0	10 weeks 6 days ago by publisher	n/a

**Thank you for your attention!**

